



Mixing Strength With Satisfaction

## ART GALLERY OF ONTARIO, TORONTO, ON

### MS MICROPILE GROUT - MS-S10 CONCRETE - IN-PAKT PRECISION GROUT

<b>PROJECT:</b>	Art Gallery of Ontario Expansion – Transformation AGO Toronto, ON
<b>DESIGN ENGINEER/ SPECIFIER:</b>	Isherwood Associates Mississauga, ON
<b>CONTRACTOR:</b>	Geo-Foundations Contractors Inc. Halton Hills, ON
<b>PRODUCT:</b>	MS Micropile Grout MS-S10 Concrete In-Pakt Precision Grout
<b>QUANTITY:</b>	400 m <sup>3</sup> (14000 ft <sup>3</sup> )
<b>COMPLETION:</b>	Fall 2006

The \$200+ million expansion and revitalization of the Art Gallery of Ontario was required to accommodate newly acquired collections, and to ensure the success of the AGO for years to come. A critical part of the project involved the design and construction of a new foundation system to support the 5-storey centerpiece tower. To facilitate the construction of the tower's foundation within the footprint of the existing structure, Isherwood Associates designed a network of micropiles, to be installed from the original subfloor of the building to the shale bedrock 20 m (65 ft) below. The restricted access conditions also necessitated a pile design that provided extremely high strength and was small enough to allow the mini drill rigs to be used in an area with less than 2.75 m (9 ft) of headroom.

A critical component of the micropile design was the MS Micropile Grout which maximized pile strength, providing typical 28-day compressive strength breaks exceeding 60 MPa (8600 psi). Plastic properties of the MS Micropile Grout allowed the grout to be pumped through a 0.85 mm (3/32 inch) id tube through typical pile lengths of 30 m (100 ft). Geo-Foundations Contractors Inc was able to proceed with production pile installation after testing a single, pre-production test pile which was load tested to 800 tonnes.

Geo-Foundations crews also faced logistical challenges related to the placement of concrete for underpinning areas within the central core of the building. To overcome this challenge, they chose to form and pump MS-S10 Concrete in larger sections of foundation wall and In-Pakt Precision Grout in smaller, sections. Both of these products met the strength and pumpability requirements and the pre-packaged materials allowed Geo-Foundations to produce small batches and maintain the sequencing of the underpinning work.

